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AN INVESTIGATION OF FACTORS ASSOCIATED WITH THE FUMROY CONCENTRATION TEST.

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DESCRIPTORS- *ATTENTION, *ATTENTION SPAN, *READING ABILITY, TEACHER ATTITUDES, ANXIETY, PERCEPTUAL MOTOR COORDINATION, *READING RESEARCH, FUMROY CONCENTRATION TEST, MINNESOTA TEACHER ATTITUDE INVENTORY,

THE RELATIONSHIPS BETWEEN SCORES ON THE FUMROY CONCENTRATION TEST (FCT) AND ANXIETY, READING ABILITY, AND PERCEPTUAL SPEED AND ACCURACY WERE INVESTIGATED. CERTAIN ATTITUDES AND PROBLEMS OF THOSE STUDENTS WHO SCORED HIGH AND LOW ON THE FCT WERE IDENTIFIED, AND THE RELATION BETWEEN CONCENTRATION SCORES AND ACADEMIC ACHIEVEMENT AND ATTITUDES TOWARD TEACHING WERE DETERMINED. SIXTY-FOUR UNIVERSITY OF MARYLAND STUDENTS WERE PRETESTED ON THE TAYLOR MANIFEST ANXIETY SCALE, AND ON THE MINNESOTA TEACHER ATTITUDE INVENTORY (MTAI). THE SUBJECTS WERE EACH GIVEN THE FCT, TACHISTOSCOFICALLY PRESENTED VOCABULARY EXERCISES, A READING COMPREHENSION TEST, AND A POST-QUESTIONNAIRE. THE FCT TASK INVOLVED CONCENTRATING FOR 3 MINUTES ON EACH OF THREE TARGETS--A "T", CONCENTRIC CIRCLES, AND A BLANK. THE ZERO ORDER CORRELATIONS FOR EACH CONCENTRATION MEASURE--TOTAL FREQUENCY AND TOTAL DURATION SCORE--WERE EXAMINED. THERE WAS A SIGNIFICANT RELATIONSHIP BETWEEN THE TOTAL FREQUENCY SCORE AND EACH OF THE FOLLOWING--THE TOTAL DURATION SCORE, THE LETTER RECOGNITION TASK, THE T-SCOPE EXERCISE--EASY WORDS SERIES, AND THE POSITIVE SCORE FOR FACTOR IV OF THE MTAI. THE BLANK TARGET WAS SIGNIFICANTLY HARDER TO CONCENTRATE ON. ANXIETY AND READING ABILITY WERE NOT RELATED TO THE CONCENTRATION MEASURES USED. THE QUESTIONNAIRES AND READING TESTS USED ARE APPENDED. A REVIEW OF THE LITERATURE, TABLES, AND REFERENCES ARE INCLUDED. (RH)

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An Investigation of Factors Associated
With the Pumroy Concentration Test

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An Investigation of Factors Associated
With the Purdy Concentration Test

ERRATA

Mueller, Arthur C.

Page 32, Paragraph 2, Line 4 eliminate "found it"
Page 33, " 1, " 5 change "auxiliary" to "anxiety"
Page 33, " 3, Change "and reading material subjects' pre and post attitudes toward participating in the experiment were tested." to reading material, and pre-experiment questionnaires"
Page 35 " 3, Line 1, change "zero order correlations were computed..."
Page 35 " 7, Line 1 change "measures" to "measures"

Inability to concentrate on studying is one of the most frequently expressed problems of college students seeking counseling and educational skills help (Voeks, 1964, Pauk, 1962, and Robinson, 1961). What is concentration? Webster's Dictionary (1958) defines the verb to concentrate as the ability "to direct one's thoughts or efforts; fix one's attention (on or upon)." Study skills manuals define concentration as "the ability to direct and control attention (Wrenn and Larsen, 1963), as "sustained attention, focused in one direction, with no distractions," (Smith, 1961), and as "the process of centering one's attention over a period of time" (Farquher, Krumboltz, and Wrenn, 1960).

Several factors appear to hamper the ability to concentrate. These have been categorized into two general classifications - internal and external. The internal factors include personal and/or emotional problems, lack of interest or motivation, and poor health. The external factors consist of the environment (poor ventilation, inadequate lighting), general conditions (auditory and/or visual distractors - loud conversations, music, cluttered desk), and poor study habits (Robinson, 1961, Glock, 1954, Hamrick, 1941, Cole, 1960, Pauk, 1962, Tussing, 1963, and Maxwell, 1965).

It has been suggested that the inability to concentrate may be due to other problems (personal or emotional) interfering with one's attention to the particular task or because one has never developed the proper study habits (Wrenn and Larsen, 1963). Along the same line it has been suggested that the lack of concentration is only a symptom and not the cause of the difficulty. When a student says, "I can't concentrate," he is really saying, "I can't attend to the task at hand because my distractors are too overpowering," (Farquher, Krumboltz, and Wrenn, 1960).

Many studies have been conducted to investigate the effect of distractors upon performance. Studies investigating the effects of music and noise upon performance have reported conflicting results.

Hovey (1928) studied the effect of general distraction upon the "higher thought processes." Two groups - control and experimental - were given six subtests of the Army Alpha form 8 under normal conditions and were given the equivalent form one and a half months later. The control group was tested under normal conditions; whereas the experimental group was tested under abnormal conditions. The distractors included: seven bells, five buzzers, a 5,500 watt spotlight, one 90,000 volt rotary spark gap, a phonograph, two adjustable organ pipes, three metal whistles, and one 55 pound circular saw (36 inches in diameter). Various combinations of distractors were used with the intervals of silence interspersed. The results indicated that the distractions did not handicap the performance of the experimental group.

Broadbent (1957) investigated the effects of high and low pitched noise on visual tasks. He had subjects perform a five choice reaction task under conditions of high and low frequency, (above and below 2000 cps) at three different levels of intensity (80, 90, and 100 db). An analysis of the results indicated that the high frequency, high intensity noise had adverse effects upon performance. In another study, Broadbent (1958) examined the effect of noise on an "intellectual task". The subjects were randomly divided into three groups; control, experimental I, and experimental II. The study consisted of two sessions conducted on consecutive days. The control group performed both sessions in relative quiet (70 db). One experimental group conducted its first session in noise (100 db), and its second session in relative quiet. Experimental group II performed in reverse order to experimental group I. The task was the same for all groups in all conditions - thirty immediate recall subtraction problems. In each case, the subject had to subtract a four digit number from a six digit number. The stimuli were presented for as long as the subject wished, but only one at any given time (the subtrahend was visually removed before the subtractor was presented).

Results of the first session indicated that the group working under the noise condition took significantly longer to complete the task then either of the two quiet groups ($P<0.05$). The results of the second session indicated that the group working under the quiet condition during the second session after a noise session took longer to solve the problems than either the control group (quiet) or the group experiencing noise as the second condition. These findings were interpreted as suggesting that noise not only effected the "intellectual task" but that it carried over from one day to the next.

Fendrick (1938) attempted to measure the change in reading or study efficiency as a function of musical distractors. Two groups were given a passage to read from an educational psychology text and sixty true-false items to answer. The control group worked under normal conditions but the experimental group heard recordings of Bolero, El Cemor Brujo (the magic circle), and El Amor Brujo (dance of the fire ritual) while reading the passage and answering the questions.

When the results were compared, the findings indicated that the experimental group did not differ from the control group in reading rate; even though it did show a definite decrease in comprehension ($P<.05$).

Henderson, Crews, and Barlow (1945) investigated the effects of classical and popular music upon reading efficiency. The subjects were matched on ACE test scores and Nelson-Denny Form A test scores and then randomly assigned to one of the three groups. There were two experimental groups, popular and classical, and one control group, no musical distractions. The subjects were given the equivalent form of the Nelson-Denny reading test while under the conditions implied by the title of their respective group. When the results of the two forms of the reading were compared, it was found that the vocabulary scores for the groups did not differ, however, the results of the comparison of the paragraph comprehension sections showed that the group who heard popular music while taking the test made significantly lower scores

than either the control group or the classical experimental group. In fact, the group that heard classical music while taking the test did not differ significantly from the control group who heard no music during the testing session. The experimenters suggested that the vocabulary section of the test did not differentiate between the treatment groups because the task itself was intermittant and unrelated, but since the paragraph comprehension task was meaningful and did require sustained effort, it was therefore susceptible to disruption by the simple and obvious rhythms and melodies of the popular music. The popular music consisted of an assortment of vocal and instrumental selections.

Freeburne and Murray (1952) investigated the effect of non-vocal musical distractions upon reading rate and comprehension. The subjects were randomly assigned to five groups, one control and four experimental groups (classical, semi-classical, popular, and jazz), one for each of the four types of music. The reading text consisted of The Robinson-Hall Test for Reading Ability (History:Form Russia) and additional material from Crompton's Pictured Encyclopedia (1950 edition). The test consisted of 50 true-false items. The results of a simple analysis of variance indicated that none of the groups differed.

A recent newspaper article titled, "Youths Concentrate Amid Loud Noise" stated that Hoffman tested 281 eleventh-grade students while "recorded music blared at them at 85 decibels for 30 minutes". He said, "Despite the noise, students of higher than average intelligence scored as well as or better on examinations than they did when tested in a quiet room. Superior readers tended to perform more effectively under loud noise than poor readers...Students of average and below average intelligence seemed to be bothered more by the sound."

In conclusion, it appears that vocal music may affect reading comprehension; whereas, non-vocal music or noise may affect performance on an intellectual task under extreme conditions-above 100 db and 2000 cps.

William James (1892) stated that "There is no such thing as voluntary attention sustained for more than a few seconds at a time. What is called sustained voluntary attention is a repetition of successive efforts which bring back the topic to the mind. The topic once brought back, if a congenial one, develops; and if its development is interesting it engages the attention passively for a time. This passive attention may be short or long. As soon as it flags, the attention is diverted by some irrelevant thing, and then a voluntary effort may bring it back to the topic again; and so on, under favorable conditions, for hours together."

Skinner's concept of the self-mand appears to provide a way to manipulate the voluntary attention described by James.

Skinner (1957) suggested that an individual could use a self-mand - a form of verbal behavior - to instruct himself to execute a task because this verbal self-instruction was reinforcing. The experimenter believes that it might also serve as a mediating goal response.

Skinner provides an example of the use of a self-mand:

> Let us suppose that a man is learning to hunt under circumstances in which it is advantageous to stand quite still (in order to let the quarry approach) in spite of a strong inclination to reduce the distance more quickly by advancing. An instructor generates the correct behavior by saying, "Stand still!" and the would-be hunter may achieve the same effect by manding his own behavior. He may have acquired the verbal response at an earlier date - perhaps from a book - or it may have been more readily learned on the spot as a

more briefer and more sharply defined response than standing still! In any case, the hunter who can tell himself "Stand still!" is probably at an advantage in controlling himself effectively in the field. The results may continue to reinforce verbal behavior in the form of self-mands.

How does one measure attention? Experimenters have devised various techniques - mostly indirect - to obtain an index of attention. It has been found, for example, that the absolute threshold in the classical psychophysical experiment increased when the subject was distracted. Changes in the absolute threshold were accompanied by similar changes in attention; therefore, the change in the absolute threshold might serve as an index of attention. Another method employed the dynamometer and the kymograph to measure the muscular pressure and rigidity thought to accompany changes in attention. Even physical changes in the respiratory and the vascular systems were studied as possible indexes of attention. Reaction time and peripheral vision were investigated as possible indexes of attention. (Philip, 1928)

Billings (1914) investigated the duration of attention. The subjects were shown pictures and papers containing dots in various arrangement. Distracting stimuli were present during the testing. The subjects were instructed to depress a telegraph key as long as the stimulus occupied their attention and to release the key whenever their attention wandered. At first the subjects had difficulty recording the precise moment of wandering. "He (the subject) would find himself thinking of something else but would not have noticed when he wandered away from the stimulus he was supposed to observe. This source of error was probably present throughout the experiment but diminished with practice." For one of the tasks, the subjects were instructed to close their eyes and to visualize a previously seen object. The subjects reported that it was impossible to keep the imaginery stimulus still. "It would still get large, then small, then turn over end for end, fade out and finally disappear altogether to return in a few seconds to go through its

contortions again." The subjects also reported that as soon as they become accustomed to the task that their thoughts tended to distract them from the task. The results showed that with practice the length, duration, of attention span decreased. It also was found that a complex stimulus (picture of an organ grinder) tended to lengthen the span of attention. The experimenter attempted to account for this by saying that "the subjects were able to wander around within or about the stimulus itself," i.e., to think about the stimulus shape, size, color, etc., thereby giving the mind an opportunity to fluctuate without getting away from the stimulus. The experimenter did not consider this as holding one's attention to one object but rather as allowing it to shift to many. The average duration was approximately two seconds.

There are certain similarities between the Billings (1914) study and the work of Pumroy (1962) and Esterson (1965). The task in all three experiments was very similar - attend to target and report each time attention wanders. Pumroy (1962), like Billings, used a telegraph key for the subjects to record their response patterns; but unlike Billings, Pumroy instructed his subjects to depress the key only when they felt their attention begin to wander (Billings instructed his subjects to release the key when their attention fluctuated). Billings obtained one performance measure - the duration of attention; whereas, Pumroy obtained two - the duration of attention and the number of times attention wandered.

In 1962, Pumroy conducted a pilot study to determine the relationship between concentration and certain variables on the MMPI and the WAIS digit span subtest. Twenty subjects were given the MMPI, the WAIS digit span subtest, and the concentration test. For the concentration task, each subject was instructed to concentrate on a thumbtack on the wall and to depress a telegraph key and keep it depressed for the length of time he was not concentrating on the target. The experimenter was able

to obtain two measures of concentration: (1) the number of times the subject lost concentration and (2) the amount of time spent not concentrating on the target during a four minute interval. The results indicated that the two concentration measures correlated .657; but when both measures were individually correlated with the K scale, the social desirability scale, the anxiety scale, and the digit span test, the correlations were relatively low. These correlations did not exceed chance expectations except for the correlation between the social desirability scaie and the amount of time the subject was not concentrating (.473 at $P_{\angle}.05$).

In 1965, Esterson conducted two retest reliability studies to determine the reliability of Pumroy's concentration test.

Subjects were tested three times, twice using a concentric circle target and once using visual imagery (close eyes and visualize the target). The first trial ran for one minute, the second trial for two minutes, and the third trial for one minute. There was a thirty second rest period between trials. Subjects were retested one month later. Two measures of performance were obtained for each subject per trial, the number of times the subject lost concentration (frequency) and the number of seconds the subject was not concentrating (duration). These scores - frequency and duration for each trial - for both test and retest were rank ordered and the subjects relative positions were compared. The results indivated that the subjects tended to remain in approximately the same position (no statistical analysis was performed).

In Esterson's second study (1965b), the subjects were presented with three, three-minute concentration tasks, with a thirty second rest period between tasks.

One task required the subjects to concentrate on a series of concentric circles; the second task required subjects to concentrate on the capital letter T; and the third task required the subjects to close their eyes and to concentrate on keeping their mind empty of all thought (blank target). The first and second

targets were mounted on 2" X 2" cards. On all three tasks the subjects were instructed to indicate a loss of concentration by using the method described in the Esterson (1965a) study - raise the forefinger. A retest was conducted approximately one month later. Two measures of performance were obtained - frequency of distraction and total duration of distraction. The total frequency score was obtained by summing the frequency scores over the three trials. The total duration score was obtained in similar fashion. The following coefficients of stability were derived: total frequency + 0.86, total duration + 0.85, frequency - blank target only, 0.87, and duration, blank target only 0.97. These findings suggest that the test is reliable.

The present study was conducted to determine the relationship between scores on the Pumroy Concentration Test and anxiety, reading ability, and perceptual speed and accuracy; to determine which target was most difficult to attend; and to identify the attitudes and problems of those individuals who scored high and low on the Pumroy Concentration Test. In addition, the relation between concentration scores and academic achievement and attitudes toward teaching was determined.

METHOD

Subjects

The sample consisted of 64 students (22 males and 42 females) enrolled in two sections of a course in Educational Psychology at the University of Maryland. The day class consisted of 33 students (12 males and 21 females) who ranged in age from 19 to 39 years with a mean age of 22.9 years. The evening class consisted of 31 students (10 males and 21 females) who ranged in age from 21 to 52 years with a mean age of 31.8 years.

The subjects were completely naive concerning the purpose of the experiment.

Apparatus

The apparatus consisted of one tachistoscope and three filmstrips, four Wollensak tape recorders, three microphones, fifteen head-sets, three Cletimer stop watches, sixty-five copies of the Taylor Manifest Anxiety Scale (TMA), sixty-five copies of the Minnesota Teacher Attitude Inventory (MTAI), sixty-seven copies of a specially designed reading test, 3 circle targets, 3 "T" targets and 64 copies of the pre-and post questionnaires.

The apparatus for the tachistoscope recognition phase of the experiment consisted of the Taylor Manifest Anxiety Scale, a tachistoscope and film strips (W(AD)1-A, W(AD)11-C, and W(AD)18-D) manufactured by Educational Developmental Laboratories. Thirty-four exposures were selected from the three filmstrips, fourteen from W(AD)1-A, and ten exposures from each of the remaining two filmstrips. Stimuli material was selected from easy, average, and hard vocabulary filmstrips. The difficulty level of each filmstrip was given by the publisher.

The apparatus for the concentration phase of the experiment consisted of the Special reading tests, tape recorders, microphones, headsets, plus the circle and "T" targets.

Both total MTAI scores and the 5 MTAI factor found by Horn & Morrison (1965) were used in analyzing the data. These factors included:

I - Traditionalistic versus Modern Beliefs about Child Control - contains items which suggest that the student is academically pampered and is not spending enough time learning the three R's. The authors state that concurrence with a majority of these items suggests that the test-taker has traditionalistic attitudes, whereas, disagreement with the majority of items suggests a liberal or permissive attitude toward teaching.

II - Unfavorable versus Favorable opinions about children - contains items which suggest that the teacher has a dislike for the exceptional child, gifted, retarded, or handicapped. In addition, the teacher displays pessimism over the student's ability to succeed academically. The experimenters suggest that individuals who are in agreement with many of these items, perceive the students and people in general as threatening. If this is true then one might suspect that those subjects who scored high on the TMA should also agree with many of the items in Factor II. Although the authors do not comment on those individuals who disagree with most of these items, one might infer that these individuals might be characterized as having a mature perception of the students and adults alike.

III - Punitive Intolerance versus Permissive Tolerance for Child Misbehavior - contains items which depict the teacher as being overly concerned with punishing "smart" rebellious" behavior rather than with rewarding good behavior, thereby striking a balance. Individuals agreeing with most of these items would be classified as possessing an attitude which implies meeting out punishment at the slightest perceived disobedience. It is a form of defensive action or possibly projection.

IV - Aloof versus Involved (sensitive, empathic) Attitude toward Children - consists of items that reflect the teacher's awareness of his inability to empathize with the students. Individuals agreeing with the majority of these items would be admitting bewilderment.

V - Laissez-Faire versus Controlling Attitude toward Children - consists of items which suggest that subjects who agree with items have the attitude that individuals are indeed free spirits.

The MTAI was scored twice, once using the normal procedure and once using an experimental procedure. The new scoring procedure was designed to allow one to determine whether the subject's responses agreed or disagreed with each of the five factors identified by Horn and Morrison (1965). Each item within a factor was given either a positive or negative score depending on whether the subject agreed or disagreed with the statement. In this manner, each factor was assigned a positive or negative value which consisted of the number of items in that particular factor that the subject agreed with as well as the number of items he disagreed with.

The Special reading test consisted of three selections (90 letter recognition tasks, 40 speeded comprehension of phrases tasks, and 40 speeded comprehension of sentence tasks) taken from the workbook, Improving Reading Ability by Stroud, Ammons, and Bamman (1956).

The circle target was composed of 20 concentric circles, the largest diameter being 2 5/8 inches. The "T" target was a 5/8 inch capital letter "T". All targets were glued on white cardboard strips 2 3/4 by 3 1/2 inches.

The pre-questionnaire was designed to identify subjects with potentially poor vision, to describe the college subjects' perception of himself, and to measure the subjects' attitudes toward reading.

The post-questionnaire was designed to determine how the subject interpreted the concentration task and how he went about the task on the various targets. (A copy of the pre and post-test is appended.)

The criterion measure for academic achievement was average score on the hourly examinations given in the educational psychology course in which all subjects were enrolled.

Procedure

Several weeks before the experiment, the subjects were administered the TMA, the MTAI, and the pre-questionnaire during a class period.

The experiment consisted of three phases: concentration, reading, and tachistoscopic recognition.

On the day of testing, the subjects reported to the testing room in the Counseling Center. As the subjects arrived, they were taken individually into small interview rooms for the first phase of the experiment, concentration. Each interview room contained a desk adjacent to one corner of the room. The desk chair was facing a corner. The target was attached to the corner at approximately eye level. To the side and behind the desk chair, was the experimenter's chair, the tape recorder, microphone, stopwatch, and instruction sheet.

The subject was seated in the desk chair facing the target in the corner. The experimenter took his seat, activated the recording device, placed the microphone and instruction sheet in his lap, and asked the subject his name. The experimenter recorded the subject's name, class, and the date.

The subject was then instructed to..."Place your forearm on the desk keeping your hand open and palm down. Look at the target on the wall and concentrate on that and that only. Most people find this difficult because other thoughts enter their consciousness such as what the experiment is about, the noise outside, and so forth. When a thought other than the target enters your mind, raise your forefinger and keep it raised until you have succeeded in pushing the intruding thought from your mind and are again concentrating on the target. At this time you may lower your finger. Are there any questions?"...

The seating arrangement was such that the experimenter could see when the subject raised and lowered his finger. Each time the subject raised his finger, the experimenter began scratching lightly on the surface of the microphone. The

scratching continued until the subject lowered his finger. At a later time the tape was replayed to determine the duration of each scratching and to tally the frequency of scratchings per target.

The subject was instructed to concentrate on the circle target for three minutes. After three minutes had elapsed, the subject was given a 30 second break. The experimenter changed the circle target to a "T" target. The subject was informed that the same instructions would apply for the second target. Three minutes later the subject was again given a 30 second break. For the third target, the subject was instructed to..."Close your eyes and concentrate on keeping your mind empty of all thought. Each time a thought enters your mind raise your forefinger and keep it raised, until you have succeeded in pushing all thoughts from your mind. When you have done this, lower your finger. Are there any questions?"

After this the subject was returned to the testing room to await the remaining two phases of the experiment.

The order to the target presentation was varied. One third of the sample was presented the circle target, the "T" target, and the blank target. The second third of the sample was presented the "T" target, the circle target, and the blank target. The remaining third of the sample was given the blank target, the circle target, and the "T" target.

Four subjects' response patterns were not recorded due to a mechanical failure of the tape recorder.

The reading phase of the experiment began with the distribution of the reading test booklets. The subjects were instructed not to open the booklets until told to do so. They were asked to put on headsets in order to listen to the taped directions. The subjects were given one minute to work through each column of the letter recognition exercises. The first column served as a practice set. Three minutes

were allotted for each of the remaining two exercises (the speeded comprehension of phrases and the speeded comprehension of sentences). When the last exercise was finished, the booklets were collected and the answer sheets for the tachistoscopic recognition phase of the experiment were distributed.

The subjects were seated facing the projector screen. They were instructed that a series of words would be flashed on the screen and that it would be their task to print on the answer sheet whatever they saw or thought they saw. Guessing was encouraged. The subjects were given four practice trials. The tachistoscopic recognition speed was set at one-hundred-fiftieth of a second.

The filmstrips were presented in order of increasing difficulty as follows: (W(AD)1-A, W(AD)11-C) and W(AD)18-D).

Following the completion of this phase of the experiment, the subjects were asked to fill out post-questionnaires.

Results

The zero-order correlations for each concentration measure, in this case total frequency and total duration score, were examined (Edwards, 1965).

The results of the analysis of the zero order correlations for the total frequency score (Table 1) indicated that there was significant relationship ($P<.05$) between the total frequency score and the total duration score, the letter recognition task, the T-scope exercise - easy words series, and the positive score for factor V of the MTAI.

Table 1

Zero Order Correlations for Total Frequency Score

Variables	Zero Order Correlation Coeffecients
Factor IV MTAI (+)	.319*
T-Scope Exercise - Easy Words	.304*
Total Duration Score	.279*
Letter Recognition Task	.272*
Taylor Manifest Anxiety Score	.225
Speeded Comprehension of Phrases	.181
Average Examination Grade in Educational Psychology Course	.166
Factor II MTAI (+)	.156
Composite Reading Score	.151
T-Scope Exercise-Average Words	.119
Factor V MTAI (+)	.115
Factor IV MTAI (-)	.107
Sex	.101
Factor III MTAI (-)	.099
MTAI Score (Regular Scoring Procedure)	.074
T-Scope Exercise-Hard Words	.068
Factor I MTAI (-)	.062
Factor III MTAI (+)	-.027
Factor I MTAI (+)	.024
Factor II MTAI (-)	.020
Speeded Comprehension of Sentences	.019
Factor V MTAI (-)	.004

*Significiant at P$\leq$.05

The results of the analysis of the zero-order correlations for the total duration score (Table 2) indicated that there was a significant relationship ($P < .05$) between the total duration score and the following variables: the total frequency score, the positive score for the Factor IV of the MTAI, and the negative score for Factor III of the MTAI.

Table 2

Zero Order Correlations for Total Duration Score

Variables	Zero Order Correlation Coefficients
Factor III MTAI (-)	.394*
Factor V MTAI (+)	.364*
Total Frequency Score	.279*
Factor I MTAI (-)	.232
MTAI Score (Regular Scoring Process)	.200
T-Scope Exercise - Easy Words	.182
Letter Recognition Task	.180
T-Scope Exercise - Hard Words	.167
T-Scope Exercise - Average Words	.150
Factor IV MTAI (+)	.132
Factor V MTAI (-)	.126
Factor III MTAI (+)	.111
Factor II MTAI (-)	.105
Speeded Comprehension of Phrases	.094
Taylor Manifest Anxiety	.091
Factor I MTAI (+)	-.084
Factor IV MTAI (-)	.067
Factor II MTAI (+)	.067
Speeded Comprehension of Sentences	-.062
Composite Reading Score	.043
Average Examination Grade in Educational Psychology Course	.023
Sex	.020

*Significant at $P < .05$

The data obtained from the two measures of concentration, frequency and duration, were analyzed using the treatment X subjects design, Lindquist (1953) and Duncan's New Multiple Range Test, Freund, Livermore, and Miller (1962).

The results of the analysis of the frequency measure indicate that: the targets did have a differential effect ($P < .05$) upon performance. Duncan's Multiple Range Test was used to determine which target or targets produced the greatest difference. The results indicated that the blank target produced significantly greater losses of concentration ($P < .05$) than either the circle or the T targets and that there were no significant differences between the circle and the T targets.

Table 3

Treatment X Subjects Design: Analysis of Frequency Measure of Concentration

Source	df	SS	MS	Fo	Fc.95
Treatment	2	198.07	99.04	10.19*	3.07
People	59	2,090.31	35.43	3.65	
Residual	118	1,147.29	9.72		
Total	179	3,435.64			

*Significant at $P < .05$

The results of the analysis of the duration measure (Table 4) indicate that the targets did have a differential effect ($P < .05$) upon performance. Duncan's Multiple Range Test was used to determine which target produced the greatest difference. The results of this test indicated that the blank target produced significantly greater losses of concentration ($P < .05$) than either the circle or the T target, and that there was no significant difference between the circle and the T targets.

Table 4

Treatment X Subjects Design: Analysis of Duration Measure of Concentration

Source	df	SS	MS	Fo	Fc.95
Treatment	2	33,972.48	16,986.24	25.71*	3.07
People	59	151,615.45	2,569.73		
Residual	118	77,975.52	660.81		
Total	179	263,590.97			

* Significant at P<.05

Figures 1 and 2 show that the blank target for both measures of concentration had the largest mean score.

Since the design was not counterbalanced, the results could have been confounded by an order effect. To test for an order effect the blank target data was analyzed using a T-test (Freund et. al., 1960).

The results of the T-test indicated that an order effect did not confound the findings (see Table 5).

Table 5

Results of T-Tests on Frequency and Duration Data

	N	to	tc	
frequency	60	0.23	2.33	N.S.
duration	60	0.37	2.33	N.S.

Figure 1
Indicates the mean frequency score for each target.

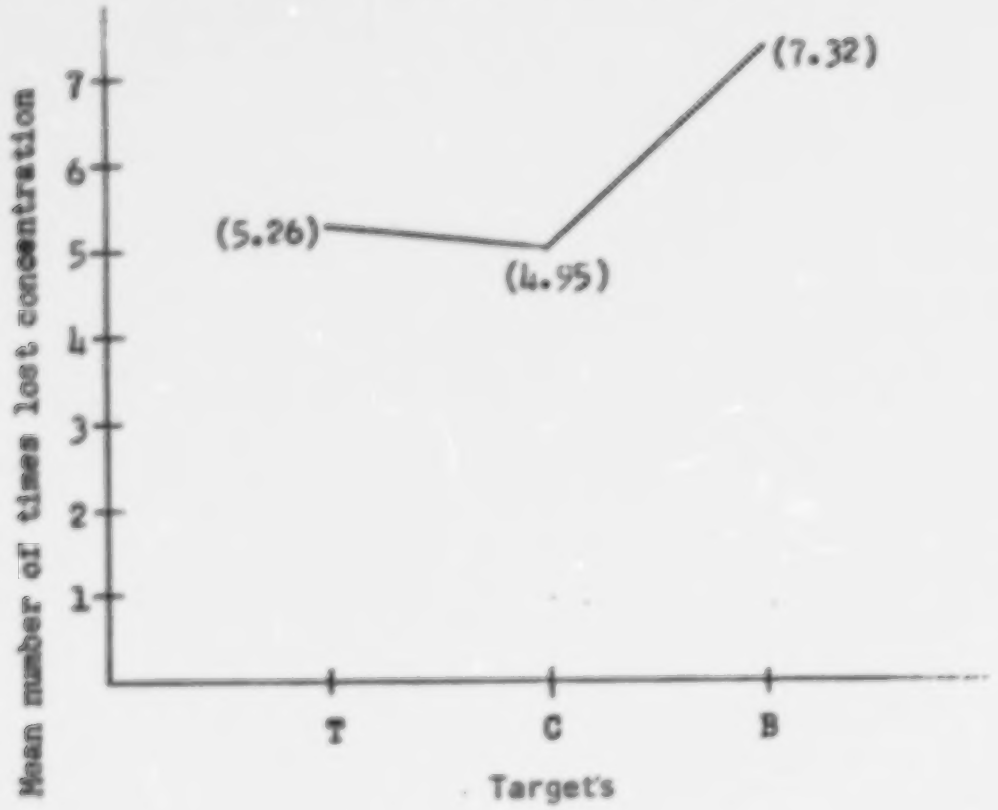
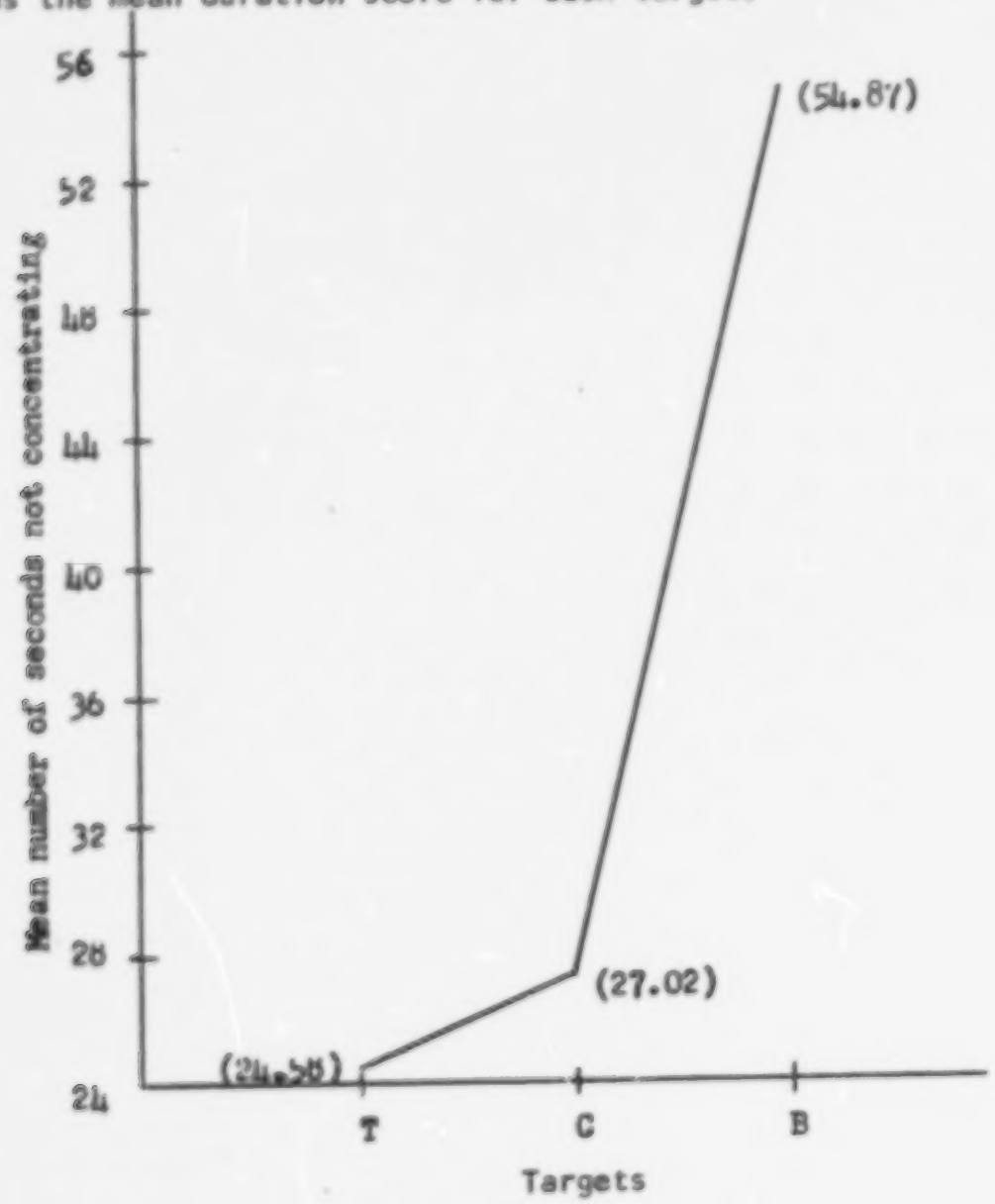


Figure 2
Indicates the mean duration score for each target.



The results of the pre- and post-test questionnaires were analyzed twice, once for each performance measure. The data was first rank ordered according to the total number of times the subject reported a loss of concentration over a nine minute period - frequency measure; and then it was rank ordered according to the total number of seconds the subject reported a loss of concentration over a nine minute period - duration measure. In both instances the responses of the top twenty-seven percent of the subjects were compared with those of the bottom twenty-seven percent.

Frequency Measure

The results of the analysis of the pre-questionnaire for the frequency measure were as follows:

1. Twenty percent of SFLC* rated themselves as talented; whereas, none of SILC* used this adjective to describe themselves.
2. Forty-seven percent of SILC rated themselves as careful; whereas, only 27 percent of SFLC did so.
3. Sixty-seven percent of SILC described themselves as purposeful; whereas, only 27 percent of SFLC so rated themselves.
4. Forty-seven percent of SFLC rated themselves as a procrastinator; whereas, only 20 percent of SILC chose this adjective.
5. Fifty-three percent of SILC rated themselves as intelligent; whereas, only 27 percent of SFLC selected this adjective.
6. Forty percent of SFLC described themselves as distractable; whereas, only 7 percent of SILC did so.

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* Note:

SFLC = those students who reported frequent loss of concentration.

SILC = those students who reported infrequent loss of concentration.

7. Thirty-three percent of SFLC rated themselves as competitive; whereas only 7 percent of SILC selected this adjective.
8. Forty percent of SILC described themselves as alert; whereas, only 13 percent of SFLC chose this adjective to describe themselves.
9. Seventy-three percent of SILC rated themselves as serious; whereas, only 33 percent of SFLC chose this adjective.
10. Thirty-three percent of SILC rated themselves as thorough; whereas, only 13 percent of SFLC did so.
11. Seventy-three percent of SILC rated themselves as responsible; whereas, only 53 percent of SFLC did so.
12. Forty-seven percent of SILC rated themselves as consistent; whereas, only 27 percent of SFLC did so.
13. Forty-seven percent of SILC rated themselves as above average; whereas, only 27 percent of SFLC did so.
14. Fifty-three percent of SILC rated themselves as productive; whereas, only 33 percent of SFLC did so.
15. Sixty-seven percent of SILC and 60 percent of SFLC reported that they occassionally had trouble concentrating while studying.
16. Sixty-seven percent of SILC and 60 percent of SFLC typically read magazines, kept up with the newspaper, and occassionally read a book.
17. Forty percent of both SFLC and SILC prefer to read good literature.
18. Fifty-three percent of SILC enjoy reading very much; whereas, only 27 percent of SFLC enjoy reading very much.
19. Fifty-three percent of both SFLC and SILC were of the opinion that adequate comprehension of a reading selection would occur if the purposes and aims of the reader were satisfied.

20. Thirty-three percent of SILC felt that when they were trying to read rapidly, they were able to read for ideas skipping unimportant words; whereas, only 13 percent of SFLC agreed with the statement.

21. Eighty percent of SILC and 73 percent of SFLC reported that they would use skimming to find out generally what the chapter of a book is about.

22. Sixty-seven percent of SILC and sixty percent of SFLC stated that when reading they adjust their rate so that their comprehension was adequate for the purpose of the reading.

23. Sixty-seven percent of SILC and 86 percent of SFLC felt that it was usually easy to get the main ideas from reading quickly.

24. Sixty percent of SILC and 73 percent of SFLC did not find it difficult to keep up with the reading assignments in their college courses.

25. Sixty-seven percent of SFLC agreed that they read slowly but felt that they were able to retain the necessary facts; whereas, 73 percent of SILC disagreed with the statement.

26. Forty-seven percent of SILC and 33 percent of SFLC were satisfied that their present reading skills were adequate for their needs.

27. Seventy-three percent of SFLC and 80 percent of SILC did not find it very difficult to recall details from their reading.

28. Ninety-three percent of SFLC and 87 percent of SILC thought that extremely slow and careful reading or extremely rapid reading did not necessarily result in thorough comprehension.

The results of the post questionnaire indicated that:

1. Forty-seven percent of SILC and 40 percent of SFLC stated that they accomplished the task of concentrating on the targets by silently repeating the name of the targets (i.e. blank, blank, blank, etc.).
2. Sixty percent of SFLC and 53 percent of SILC stated that the blank target was most difficult.
3. The modal response of SFLC and SILC to the question, "What was it about the blank target that made it so difficult?", was one could not keep from mentally verbalizing (keep one's mind blank).
4. Thirty-three percent of SFLC and SILC rated the circle the easiest target.
5. The modal response to the question, "What was it about the circle target that made it easy?", was the same for both SFLC and SILC because of the illusion of movement.
6. Eighty-six percent of SFLC and 67 percent of SILC thought that the concentration experiment was interesting.
7. Thirty-two percent of SILC and 20 percent of SFLC stated that they were able to pull their minds back to the task of concentrating by mentally repeating the titles of the targets.
8. Sixty-seven percent of SFLC stated that it was most difficult to concentrate when it was noisy; whereas, only 33 percent of SILC made the same statement.
9. Sixty-seven percent of SFLC stated that it was easy to concentrate when it was quiet; whereas,only 40 percent of SILC held the same opinion.

Duration Measure

The analysis of the pre-questionnaire for the duration measure indicated that:

1. Fifty-three percent of SILC rated themselves as alert; whereas, only 20 percent of SFLC did so.
2. Forty percent of SFLC rated themselves as competitive; whereas, only 13 percent of SILC described themselves as such.
3. Fifty-three percent of SFLC rated themselves as procrastinators; whereas, only 13 percent of SILC so rated themselves.
4. Twenty percent of SFLC described themselves as talented; whereas, none of SILC did so.
5. Seventy-three percent of SILC described themselves as practical; whereas, only 53 percent of SFLC did so.
6. Twenty-seven percent of SFLC described themselves as distractable; whereas, none of SILC did so.
7. Twenty percent of SFLC described themselves as easily distracted; whereas, none of SILC did so.
8. Thirty-three percent of SFLC rated themselves as usually having trouble while studying; whereas, only 13 percent of SILC shared this problem.
9. Fifty-three percent of SFLC preferred to read good literature; whereas, 33 percent of SILC held the same preference.
10. Sixty percent of SILC and 47 percent of SFLC enjoyed reading very much.
11. Sixty-seven percent of SFLC were of the opinion that adequate comprehension of a reading selection would take place if the purposes and aims of the reader were satisfied; whereas, only 40 percent of SILC held the same opinion.

12. Forty percent of SILC felt that they could not read as fast as they would like to when trying to read rapidly; whereas, only 13 percent of SFLC responded in the same manner.

13. Sixty-seven percent of SFLC found it difficult to keep up with the reading assignments in their college courses; whereas, only 27 percent of SILC found this to be the case.

14. Sixty-seven percent of SFLC felt that they read slowly but retained the needed facts; whereas, only 40 percent of SILC held this same opinion.

15. Sixty-seven percent of SFLC and 53 percent of SILC described the typical amount of outside reading as "some" (i.e., keep up with newspapers, magazines, and an occasional book).

16. Eighty-seven percent of SFLC and 73 percent of SILC stated that they would use skimming to find out generally what the chapter of a book is about.

17. Sixty percent of both SFLC and SILC stated that when reading, they adjust their rate so that their comprehension is adequate for the purpose of the reading.

18. Seventy-three percent of SFLC and 67 percent of SILC felt that it was usually easy to get main ideas from reading quickly.

19. Sixty-seven percent of SILC and 60 percent of SFLC were not satisfied that their present reading skills were adequate for their needs.

20. Eighty percent of both SFLC and SILC stated that they did not find it very difficult to recall details from their readings.

21. Ninety-three percent of SFLC and 87 percent of SILC stated that extremely slow and careful reading or extremely rapid reading did not necessarily result in thorough comprehension.

The analysis of the post questionnaire for the duration measure was as follows:

1. Sixty-seven percent of SILC reported that they accomplished the task of concentrating on the target by silently repeating the names of the targets (i.e., blank, blank, blank, etc.); whereas, only 40 percent of SFLC accomplished the task in the same manner.
2. Sixty-seven percent of SFLC and 60 percent of SILC rated the blank target as most difficult.
3. SILC modal response to the question, "What was it about the blank target that made it so difficult?", was because it was meaningless, they needed something to focus on. SFIC modal response to the same question was because one could not think about nothing.
4. Forty-seven percent of SFLC and 40 percent of SILC rated the circle target as the easiest target.
5. Both SFLC and SILC modal response to the question, "What was it about the circle target that made it easy?", was "because of its apparent movement (pulsation) which tended to produce a semi-drugged state."
6. Seventy-three percent of SILC and 67 percent of SFLC thought that the experiment was interesting.
7. Fifty-three percent of SILC were able to pull their minds back to the task of concentrating by mentally repeating the title of the targets; whereas, only 27 percent of SFLC used this technique.
8. Sixty-seven percent of SFLC and 60 percent of SILC reported that it was difficult to concentrate when the conditions were noisy.
9. Sixty percent of SFLC and 53 percent of SILC reported that it was easy to concentrate in a quiet environment.

Discussion

The results of the study will be discussed in relation to the two measures of concentration. Whenever both measures produced the same results they will be discussed as one; whenever differing results are obtained each measure will be discussed separately.

The results of the zero order correlation indicated that anxiety was not related to either measure of concentration. These findings support those of Pumroy (1962). He correlated various scales from the Minnesota Multiphasic Personality Inventory - the anxiety scale among them - with the two measures of concentration and found that the anxiety was not related to the concentration test. It is not too surprising that the present results were similar to those of Pumroy (1962) because the present study used the TMA which consists of items from the MMPI.

It was assumed that reading ability, perceptual speed and accuracy, and concentration would be interrelated. The results do not bear this out. The results indicated that the reading test was not related to either measure of concentration.

Upon examination of the zero order correlations between the reading sub-tests and the two measures of concentration, slightly differing results were found.

The duration measure of concentration was shown not to be related to any of the sub-tests. This was interpreted as suggesting that either the reading test was not valid or the concentration task is not related to a complex skill like reading.

The frequency measure of concentration was related only to the letter recognition sub-test.

The results of the zero order correlations between the measures of concentration and the perceptual speed and accuracy tests were very similar to those of the reading sub-tests.

The duration measure of concentration did not correlate with any of the perceptual speed and accuracy tests and in addition only one of the three tests - the T-scope easy words test - was related to the frequency measure of concentration.

These findings when considered in the light of the results of above suggest that the Pumroy concentration test is measuring simple tasks perhaps more similar to those found in vigilance studies rather than intellectual tasks associated with the manipulation of the written language.

The results indicated that when the MTAI was scored by the regular procedure, it did not correlate with either measure of concentration. But when the experimental scoring procedure was used divergent findings were obtained from the two measures of concentration.

The frequency measure of concentration correlated with the positive score on factor V of the MTAI. If this can be extended to the general population, it would imply that one who is capable of sustained attention or, and most important, reports that he maintains sustained attention, does not readily empathize with others, is aware of it and as a result of it is bewildered. The duration measure of concentration correlated with both the negative score on factor III and the positive score on factor V. Provided these descriptions can be extended to the general population they describe the individual who reports of sustained attention as not perceiving others as threatening and does not believe that the individual is a pawn to be manipulated to suit ones personal desires.

The results of the Treatment X Subjects design and Duncan's multiple range test indicated that the blank target was the most difficult target to attend. This was the case for both measures of attention. It suggests that it is very difficult, if not impossible, to keep ones mind empty of all thoughts. These results were not

confounded by an order effect.

The study should be repeated; using more strigent controls; i.e., the subjects should be randomly assigned to target sequences and the order of target presentation should be counterbalanced using possibly a Latin Square design.

Frequency Measure

The results of the analysis of the pre- and post-questionnaires for the frequency measure are summarized below:

The student who reported frequent loss of concentration described himself as being talented, competitive, distractible and a procrastinator. He felt that it was easiest to concentrate when the surroundings were quiet and conversely, that it was hardest to concentrate when the surroundings were noisy.

The student who reported infrequent loss in concentration described himself as careful, purposeful, intelligent, alert, serious, thorough, responsible, consistent, above average, and productive. He enjoys reading very much, and when reading rapidly is able to read for ideas skipping unimportant words. He does not believe that he reads slow, but he does retain needed facts.

All subjects agreed: (1) that occasionally they had trouble concentrating while studying, (2) that typically they were able to read some (keep up with magazines, newspapers, and an occasional book), (3) that they prefer to read good literature, (4) that they believe that adequate comprehension of a reading selection will occur if the purposes and aims of the reader were satisfied, (5) that they would use skimming to find out generally what the chapter of a book is about, (6) that when reading they adjust their rate so that their comprehension is adequate for the purpose of their reading, (7) that it was usually easy to get the main ideas from reading quickly, (8) that it was not difficult to keep up with their college reading assignments, (9) that their present reading skills

were adequate, (10) that they did not find it difficult to recall details from their readings, (11) that neither extremely slow and careful reading nor extremely rapid reading will result in thorough comprehension, (12) that they were able to concentrate on the targets by repeating the titles of the targets, (13) that the blank target was the most difficult because one could not keep from mentally verbalizing, (14) that the circle target was the easiest target on which to concentrate because of its illusion of movement, (15) that they could pull their mind back to the task of concentrating by mentally repeating the titles of the targets.

Duration Measure

The results of the analysis of the pre- and post-questionnaires for the duration measure indicate that the student who reported infrequent loss of concentration perceives himself as being an alert individual who feels that he does not read as fast as he would like to.

The student who reported frequent loss of concentration on the other hand describes himself as talented, practical, a procrastinator, discontented, competitive, and easily distracted. He states he usually has trouble concentrating while studying, prefers to read good literature, and believes that adequate comprehension of a reading selection will take place if the purposes and aims of the reader are satisfied. He reads slowly and has difficulty keeping up with his reading assignments, but believes that he does retain the needed facts.

Both groups were in agreement on several items: they both enjoyed reading very much, but typically were only able to do some reading (i.e., keep up with the newspaper, magazines, and an occasional book), they used skimming to find out generally what the chapter of a book was about, and they adjusted their reading rate so that their comprehension was adequate for the purpose of the reading. Both found that it was usually easy to get main ideas from reading quickly and that it was not very difficult to recall details from reading, but they were not satisfied with their

present reading skills. They both believed that neither extremely slow and careful reading nor extremely rapid reading would necessarily result in thorough comprehension.

Both SFLC and SILC stated they attend to the various targets by silently repeating their titles (i.e., blank, blank, blank, etc.). Both rated the blank target as the most difficult to attend to because it "was meaningless" and "one could not think about nothing". They both also agreed that the circle target was the easiest to attend to because it appeared to move - to pulsate. Whenever their mind wandered from the target, they were able to pull it back by silently repeating the title of the target. Both reported that it was easy to concentrate when the surroundings were quiet and conversely that it was most difficult to concentrate when it was noisy.

It was hoped that the post questionnaires would provide some indication of how the students were able to attend to the targets found it and whether it would be feasible to experiment with self-instructions (self-mands).

The analysis of this particular question indicated that the subjects were not using self-mands but instead were merely repeating the name of the target. If the subjects would have given direction to their recitation it might have been helpful. If for example, they would have repeated the statement, "Concentrate on the blank target," instead of repeating the title of the target.

This does not preclude the use of self-mands. On the contrary it suggests that with proper structure and explicit definitions that this concept may provide a means to redirect attention when it begins to wander.

Summary

Sixty-four upper division University of Maryland students (22 males and 42 females) were pretested on the Taylor Manifest Auxilary Scale (TMAS) and Minnesota Teacher Attitude Inventory (MTAI) and then given an individual experimental session involving the Pumroy Concentration Test, tachistoscopically presented vocabulary exercises, and reading material subjects' pre- and post attitudes toward participating in the experiment were tested.

The Pumroy Concentration task involved concentrating for three minutes on each of three targets - a "T", concentric circles, and a blank target with instructions to keep your mind blank. The order of presenting targets was varied.

Zero order correlations computed between each of the two concentration measures: (1) frequency - number of times subjects reported their minds off target and (2) duration - length of time subjects reported their minds off target and all of the other variables.

Significant correlations with total frequency score included Factor IV - MTAI indicating bewilderment concerning one's inability to emphathize with children; recognition of tachistoscopically presented easy vocabulary words; total duration score and a letter recognition task.

Significantly correlated with the total duration concentration score were 1) Factor III - MTAI (-) permissive tolerance for child misbehavior, 2) Factor V - MTAI (1) laissez-faire attitude toward child behavior and total frequency score.

Other findings included:

The blank target was significantly harder to concentrate on than the "T" or "concentric circles" whether measured by frequency of reported mind wandering or duration (time off target).

Anxiety and reading ability were not related to the concentration measured used.

Pre-and post-questionnaire items were analyzed to determine differences between good and poor concentrators.

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APPENDIX

Reading Questionnaire

1. Name _____
   (last) (first) (middle initial)
2. Student Number _____
3. Age _____
4. Sex _____
5. College _____
6. Class (circle): Fresh., Soph., Jr., Sr., Grad.,
7. Semester (circle): First Second
8. Date entered Maryland _____
9. Degrees held _____
10. Degree working toward _____
11. When did you last have your eyes examined by a professional eye doctor (Ophthalmogist or optometrist) _____
12. Do you wear glasses or contact lens? _____
    If yes, when was the last time you were in for a check-up? _____
13. Rate your vision (check one)

    ___ good
    ___ fair
    ___ Poor

14. What do you estimate your reading rate is;
    i.e., words per minute (state in numbers) _____
15. Using the following list of adjectives, how would you best describe yourself in college (check <u>those</u> which are appropriate)

___ Talented	___ Studious	___ Intellectual
___ Inefficient	___ Flighty	___ Retiring
___ Practical	___ Discontented	___ Alert
___ Average	___ Original	___ Above Average
___ Unsuccessful	___ Responsible	___ Naive
___ Successful,	___ Consistent	___ Productive
___ Careful	___ Intelligent	___ Slow
___ Through	___ Distractible	___ Ambitious
___ Purposeful	___ Lazy	___ Indecisive
___ Disinterested	___ Perfectionist	___ Irresponsible
___ A Procrastinator	___ Competitive	___ Serious
___ Unreliable	___ "A Grind"	___ Easily Distracted

16. How many hours per week do you typically spend studying?

1. ___ less than 10 hours
2. ___ 11-20 hours
3. ___ 21-30 hours
4. ___ 31-40 hours
5. ___ more than 40 hours

17. Number of academic hours carrying this semester. _____

18. Do you have trouble concentrating while studying?

1. rarely
2. occasionally
3. usually
4. almost always

19. Do you consider difficulty in concentration a problem?

Explain -

20. How would you describe the amount of reading you typically do - aside from course assignments and requirements?

1. read extensively (several books a week)
2. read quite a bit (a book a week plus newspapers, magazines, etc.)
3. read some (keep up with newspapers, magazines and an occasional book)
4. limited outside reading (newspapers and an occasional magazine)
5. very little outside reading

21. What types of books do you prefer to read?

1. popular fiction 2. good literature 3. non-fiction social science
4. non-fiction social science 5. have no strong reading preference
6. other (specify) _____

22. How would you rate yourself on your enjoyment of reading?

1. enjoy reading very much
2. like to read when other things aren't pressing
3. am indifferent about reading
4. would rather avoid reading if possible
5. generally dislike to read

23. In your opinion, adequate comprehension of a reading selection will take place if:

1. all main ideas and details are remembered
2. the purposes and aims of the reader are satisfied
3. the reader takes time to read the selection first rapidly and then slowly
4. the reader takes account of the difficulty of the material
5. the words of the reading are weighed and analyzed

24. When trying to read rapidly, I feel that I:

    1. tend to read almost every word
    2. cannot do it as fast as I'd like to
    3. get only a few ideas rather than as much as I'd like
    4. am able to read for ideas, skipping unimportant words
    5. tend to lose a good deal of comprehension

25. I would use a skimming for:

    1. finding out generally what a chapter book in a book is about
    2. reading material I find difficult
    3. reading light, easy materials
    4. covering more words per eye-movement than usual
    5. catching up with my assignments

26. When reading, I adjust my rate so that;

    1. I get the highest comprehension
    2. the reading may be done as rapidly as possible
    3. my comprehension is adequate for the purpose of the reading
    4. main ideas and details are clearly understood
    5. it is flexible to the style of the author

27. NOTE: On the following questions, indicate whether you:

    1. strongly agree
    2. agree in general
    3. disagree in general
    4. strongly disagree

28. I feel that it is possible for most people to greatly improve their reading speed.

29. It is usually easy for me to get the main ideas from my reading quickly.

30. I find it difficult to keep up with the reading assignments in my college courses.

31. I read slowly but retain the facts I need well.

32. I am satisfied that my present reading skills are adequate for my needs.

33. I find it very difficult to recall details from my reading.

34. Extremely slow and careful reading or extremely rapid reading do not necessarily result in thorough comprehension.

POST-QUESTIONNAIRE
Reading Experiment III - Spring '65

1. Name _____
(Last) (First)

2. How did you accomplish the task of concentrating on the targets?

Explain _____

_____

_____

3. Did you use the same method when concentrating on all three targets? If you used a different method of concentrating for different targets, explain.

_____

_____

_____

_____

4. Rank order the targets according to difficulty level; (i.e., 1st - most difficult, 2nd - difficult, 3rd - easiest)

_____a. Concentric Circles

_____b. "T"

_____c. Blank mind

5. What was it about your 1st choice in question 1 that made it most difficult? Explain

_____

_____

_____

6. What was it about your 3rd choice in question 1 that made it easy? Explain_____

_____

_____

_____

7. You found that phase of the experiment dealing with concentration - (check one)

_____a. interesting

_____b. dull and boring

8. When you found yourself not concentrating on the target what did you do to pull your mind back to the task of concentrating? Explain_____

_____

_____

_____

_____

_____

9. How did you feel while participating in the concentration phase of the study? Rate yourself

_____a. Angry

_____b. Anxious

_____c. Nervous

_____d. Tense

_____e. Confused

_____f. Bored

_____g. Somewhat relaxed

_____h. Relaxed

10. Under what conditions do you find it <u>difficult</u> to concentrate? Explain_____

_____

_____

Under what conditions do you find it <u>easy</u> to concentrate? Explain_____

_____

_____

11. Describe your feelings during that part of the study when words were flashed on the screen._____

_____

_____

12. Did you find the words that were flashed on the screen difficult? Check one.

_____a. Yes

_____b. No

13. Do you feel that you missed words because the exposure time was too brief?

_____a. Yes

_____b. No

14. Comments or remarks: (Anything you would like to say that has not been covered in the questionnaire).

_____

_____

_____

_____

DIRECTIONS

IN THE EXERCISES IN LETTER RECOGNITION THE INITIAL GROUP OF LETTERS IS REPEATED IN EACH ROW. FIND THE GROUP THAT IS EXACTLY THE SAME AS THE FIRST GROUP AND CIRCLE IT. DO NOT BEGIN UNTIL THE EXPERIMENTER GIVES THE SIGNAL.

ato	ate	aot	ato	toa	tao
ndh	ndh	hdn	nbh	hbn	nhd
ivg	vig	gvi	giv	ivg	igv
nge	nge	egn	neg	gen	egn
tri	tir	tri	irt	itr	rit
wor	row	owr	wor	wro	wre
abl	abi	abt	lab	lba	abl
eco	oce	eoc	eco	oec	coe
hti	thi	hti	ith	tih	hit
onl	oml	omi	oni	onl	oln
mrn	nrm	rnm	rmn	mrn	nmr
ist	tsi	its	sti	ist	tis
odt	tod	dot	dto	odt	odi
dea	ead	dae	dea	aed	ade
sha	ash	hsa	has	sah	sha
rpu	rpu	pur	rqu	upr	uqr
wri	wir	wlr	wrl	wlr	wri
hus	suh	shu	hsu	ush	hus
weh	hew	weh	ehw	ewh	owh
fin	fim	mif	ifn	nif	fin
gth	ght	thg	htg	gth	eth
itw	wit	wlt	ltw	itm	itw
cvt	cvt	cyt	evt	eyt	tcv
wks	wsk	swk	wks	skw	slw
ult	tlu	utl	ltu	ult	uit
hep	hpe	hcp	hop	peh	hep
ied	dei	die	ied	ide	edi
ohd	odh	hod	ohd	doh	deh
meu	ume	meu	eum	eun	neu
eha	eha	cha	ahe	aeh	hea
stu	sut	uts	stu	ust	tus
dth	the	dth	dht	thd	tdh
nik	ink	kni	ikn	nki	nik
ert	tre	ter	ert	ret	etr
unt	unt	tun	nut	utn	ntu
dsa	sad	ads	asd	dsd	dsa
emo	eom	ome	emo	moe	meo
ble	elb	dle	eld	ble	led
ced	ced	ceb	bec	dec	ecd
rhe	her	rhe	erh	hre	rch
ner	nre	ner	ren	ern	enr
gui	giu	iug	gui	ugi	uig
mak	mak	amk	kma	kam	akm
bda	bad	dab	abd	abb	bda
sev	vse	evs	ves	esv	sev

STOP

DO NOT TURN THE PAGE

eal	oal	lae	ale	eal	ela
hth	hht	hth	thh	hlh	hih
ngw	wgn	ngw	wng	gnw	gwn
seo	soe	oes	eos	seo	ose
cle	cel	lec	elc	ecl	cle
nin	nim	mim	min	nin	inn
ype	epy	vpe	pey	ype	eyp
ewo	owe	eow	woe	ewo	ewe
are	rae	aer	are	era	arc
tor	rot	ort	tro	rto	tor
nle	nie	nle	mle	mie	len
akr	akr	rka	ark	kra	rak
lan	aln	nal	lan	anl	lna
oti	iot	ito	tio	oti	toi
het	the	eth	eht	het	teh
ofw	wfc	cfw	ofm	ofw	wfo
rgd	dgr	rgd	gdr	grd	rgb
suc	cus	cur	suc	sue	ucs
nid	ind	nid	idn	dni	din
tyr	ytr	try	tvr	tyr	ryt
ent	ent	ten	net	etn	nte
ste	set	ste	tse	tes	est
ath	tha	aht	hta	ath	ate
nof	nof	mof	fon	onf	ofn
dem	emd	dem	med	edm	dme
ofa	fao	afo	aof	ofa	oaf
rep	rep	per	erp	pre	epr
lle	iie	lel	ell	lle	eil
tas	ast	tsa	tas	sat	ats
gel	gle	gel	leg	egl	elg
rof	orf	fro	for	erf	rof
sof	sof	scf	fos	ofs	osf
owt	two	owt	tvo	ovt	otw
hec	che	hec	ceh	heo	hoe
oro	ere	ore	oro	ero	ror
sed	sde	sed	eds	dse	des
cho	ohc	och	coh	hoc	cho
tai	ait	tai	iat	ita	ati
dfe	def	fed	efd	fde	dfe
otf	oft	tfo	eft	otf	fto
ing	img	lng	lmg	ing	ign
gra	agr	gra	arg	rga	rag
fio	foi	fci	fie	oif	fio
ome	oem	ome	emo	eom	moe
inc	cni	lnc	inc	cin	icn

STOP

DO NOT TURN THE PAGE

DIRECTIONS

CIRCLE THE PHRASE CLOSEST IN MEANING TO THE FIRST PHRASE

1. the required time: to take away; another of that kind; certain length of period; the wiser of the two; under my care.
2. of no value: the way to be sure; wil want to know; no such mistake; completely worthless; later on.
3. a trivial matter: who are available; of little importance; to some other person; not long ago; occasional visit.
4. unanimous vote: is not true; as he grows older; between intervals; on schedule; agreement by all.
5. being undernourished: if you cannot; to supply with insufficient nourishment; consult with the doctor; regular schedule; as soon as possible.
6. to understand: letting him cry; long enough to decide; to gain full meaning; hunger approaches; at least not until the end.
7. that which is unique: in the first place; single in kind or excellence; even though; well adjusted; to make the decision.
8. being unlimited: most commonly used; contains a mixture; a form of gas; not bounded by proper exceptions; containing several things.
9. being without a fixed value: that which is unpriced; some of the formula; finishing the task; if you can reach; arrived too late.
10. contrary to natural instincts: unrefined form; useful to everyone; considered as abnormal; of some food value; a tendency to lose.
11. to press upon attention: of the same amount; into each bottle; to urge forward; instead of the usual; a gradual decline.
12. designed as a guide: at the end of the day; increasing in number; one way or another; a sort of pattern; dropped by the wayside.
13. a short hurried view: one way is solved; for more than a few minutes; learning to walk; to take a glimpse; to report late.
14. a great handicap: one way to success; of considerable help; knowing nothing about; clearing up the situation; that which is a disadvantage.
15. destitute of help: several occurrences of the same type; should be examined; of great need; sudden disaster; not real reason.
16. a place of union: in other words; a common junction; blamed for the wrong; which were found; in many cases.
17. an act of good will: recommended by the best; of little value; a multiple choice; quality of kindness; in the upper part.
18. living under false pretense: rare cases; being incognito; a part of the respiratory system; we realize the mistake; startled by loud noise.
19. to mix confusedly: to jumble things up; a pretty tough time; in another instant; when she acts; trained speech teachers.
20. to be outstanding: the average intelligence; in rare cases; too early to see; most of the time; to stand out distinctly.

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1. classified as sensitive: highly concentrated; devoted to pleasure; conveying a message; to take part in; having the capacity of receiving impressions.
2. a very robust person: one who displays strength or vigor; allowed special privileges; marked by crime; efficient as can be; a rodent animal.
3. any opposing force: device for artificial respiration; a stopping place; a resting place; primary cause; a great resistance.
4. worthy of respect: supporting an answer; decent in behavior and character; short pause in reading; to resume speed; to progress onward.
5. available means: to prevent inhalation; reserve source of supply; characterized by responses; act of resounding; to dissolve.
6. that which is parallel: sometimes restricted; any march or procession; a resemblance; lying evenly everywhere in the same direction; consisting of several paragraphs.
7. that which is nonsense: to determine; a peculiar sort of type; having no meaning; being standard; an interior corner.
8. during the noonday: sometime in the evening; in the middle of the day; under obligation; of different variety; coming from the other direction.
9. under normal conditions: occurring naturally; things of no importance; to reduce in size; from the outside; a native or inhabitant.
10. of a lazy nature: an allowance of time; never the same; during the service; disinclined to action; never the same.
11. an inanimate object: inward bound, want of caution; not having life; unfavorable weather; a small distance.
12. true to history: to come upon or meet; being historical; a stop or sudden halt; a hidden supply; of absolute value.
13. of comparative excellence: a piece of armor; to replenish with care; that which is good; one holding views; a common word.
14. of good humor: more generalized; various situations; having ornamental design; one who is pleasant and cheerful.
15. being the most remote: lessening of the power; to provide what is necessary; furthermost away; lighter in color; a decorative design.
16. time that is to come: to a great extent; without prospects; to banish from the earth; done by stealth; that which is the future.
17. delirious excitement: characteristic of; to affect with frenzy; to harden; of various classes; noted for its beauty.
18. state of being friends: case of sickness; art of eating; what is known as friendship; immediate change; current material.
19. a duplicate of something: to treat as a pet; to cause to wither; last part of a course; a thing that promotes; an exact copy of the original.
20. to droop: lifting carefully; process of drifting; showing promise; to hang bending downwards; to chase.

STOP

DO NOT TURN THE PAGE

DIRECTIONS

The exercises in sentence comprehension consist of a general statement followed by ten statements, some of which are similar and some different in meaning. Circle the letter S after each of the ten sentences that agrees with or is similar to the original statement. Circle the letter D after each that is different in meaning from the original statement. Sentences should be marked S when they say the same thing in the same or different words or express the same general idea or an idea closely related to the original statement. Sentences should be marked D when they are unrelated in meaning or are contradictory in meaning, although they pertain to the same topic.

Reading ability can be improved through the elimination of inefficient habits.

1. Reading books is one of the many ways to obtain knowledge. D S
2. To read a considerable number of good books is good for one's intelligence. D S
3. Through hard work one can improve his reading ability. D S
4. Inefficient habits are ruinous to any type of work. D S
5. Doing away with inefficient reading habits will improve one's reading. D S
6. Habits are easily formed. D S
7. Working your way through college is quite desirable. D S
8. Acquiring good reading ability takes a good deal of hard work. D S
9. Inefficient habits in reading should be replaced if one is to be a good reader. D S
10. Good books can be found in all libraries. D S

Individuals differ from one another in the amount of opportunity they have to learn.

1. Some people don't have the same opportunities to learn as others. D S
2. Learning is dependent upon many factors. D S
3. Each individual must have a desire to learn. D S
4. A Difference in environment makes a difference in the type of learning by the individual. D S
5. Various opportunities are open to those who really want to learn. D S
6. Differences in opportunity influence the amount of learning by the individual. D S
7. Further learning is possible if the individual desires it. D S
8. There are various ways of learning. D S
9. One learns more to assure himself greater success. D S
10. To be successful one must acquire certain methods of learning. D S

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Learning will usually progress more rapidly if stress is put on the need. for it.

1.	Learning will increase with age as a rule.	D S
2.	Emphasizing the need of learning will usually cause it to progress more rapidly.	D S
3.	The progress of learning is probably slow at first, but increases with age.	D S
4.	One will always find an education useful.	D S
5.	Some things will be learned easier than others.	D S
6.	Slow learning will often occur in a complex task.	D S
7.	Learning involves many difficult tasks.	D S
8.	Progress in learning will be more rapid if emphasis is put on the need of it.	D S
9.	Youth should be the principal time for learning.	D S
10.	Stressing the need for learning will usually cause it to progress more rapidly.	D S

Improvement of one's memory for lesson material can be accomplished by applying it to some practical purpose.

1.	By applying the lesson material to some practical purpose, it can more easily be memorized.	D S
2.	Memorizing is not difficult if you don't want it to be difficult.	D S
3.	One can improve his personality greatly if he can manage to get along with others.	D S
4.	Lesson material can easily be unlearned.	D S
5.	Improvement can be made of one's memory by applying the lesson material to a practical purpose.	D S
6.	Improvement can be made in anything you do if you just have the will to do it.	D S
7.	Lesson material applied to some practical purpose will fix it upon one's memory.	D S
8.	Being practical always seems to pay in many respects.	D S
9.	Learning by cramming is a very inefficient method.	D S
10.	The more relationships you see in lesson material, the easier it is to learn.	D S

STOP